



White Paper

# A Better Way to Manage Airports: Passenger Analytics

## Insights from ICF

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### Executive Summary

Airport managers increasingly face operational challenges from steady passenger growth, terminal congestion, rising costs, and difficulty in funding infrastructure. These factors are a simple recipe for deficient facilities, poor service, and unhappy passengers. However, the emerging field of passenger analytics is beginning to be applied to airports, with highly encouraging results. Passenger analytics offers new tools and processes to help airport managers make more effective decisions that improve airport performance, make better use of terminals, generate nonaeronautical revenue, and enhance the passenger experience from curb to gate. Because of a lack of data sharing with other key stakeholders (airlines, government entities, concessionaires, etc.), airport managers have never had a complete view of what goes on at their own airports. Passenger analytics changes this dynamic through a combination of sensor tracking technology, predictive modeling, and new management practices. The innovative combination of information, planning, and coordination can fundamentally change how today's airports are managed. This paper discusses the challenges that airports face and how passenger analytics and proactive management can help to meet current and future needs.

**Management by information**

Using passenger analytics can improve terminal space efficiency—enhancing the passenger experience—and more strategic decisions.

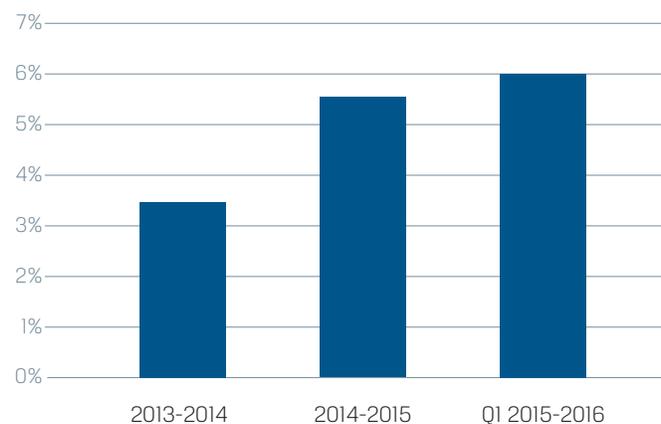
**Airport efficiencies: Historic (and ongoing) challenges**

The current realities of major U.S. hub airports are no surprise to passengers who have experienced the frustration of long security lines, crowded terminals, and long delays getting from the curb, through security, and to the gate. The primary ongoing challenges are three fold:

- Strong passenger growth at our largest airports is creating significant congestion—longer lines, more foot traffic, and a more crowded experience navigating throughout terminals.
- A long time horizon is required for the necessary terminal expansion to accommodate passenger growth, more flights, and space for customer amenities.
- Paying for terminal expansion faces funding challenges.

Historically, airport managers have had access to very limited information about how passengers, meeters and greeters, and other stakeholders use the airport. For both real and perceived concerns about proprietary, competitive, and turf issues, airlines are reluctant to share all but the highest level of passenger information. The information they do have is often limited and generic. The result? Airport management has equally limited generic insight into terminal passenger flows or bottlenecks within the terminal. How significant is this problem? For airport managers tasked with improving efficiencies, keeping passengers happy, and keeping costs down, this lack of insight has reached a critical stage.

**EXHIBIT 1. YEAR-OVER-YEAR GROWTH FOR TOP 25 LARGEST U.S. AIRPORTS, IN AGGREGATE**  
2013 to first quarter 2016



The largest U.S. airports are currently growing much faster than the national average of 2.0% annually

\*Note: for Q1 2016 only 13 airports have reported activity

Source: ACI World Airport Traffic April 2016

Because passenger terminal flow patterns can vary significantly based on season, day, and hour, specific times may see serious congestion within particular zones: the curb, the airline check-in area, security checkpoints, commercial areas, hold rooms, the gate, passport control and customs, arrival areas, and ground transportation access points. And of course this congestion, confusion, and delay can contribute negatively to the overall passenger experience.

**Where passenger analytics can help:**

- Curb management
- Airport lobby
- Check-in desks
- Security screening
- Wayfinding and advertising
- Retail and commercial areas
- Gate management
- Passport control
- Bag claim
- Ground services (car rental, limousines)
- Car parking

Anecdotal evidence of congestion and bottlenecks from day-to-day observations and passenger complaints have resulted in rough rule-of-thumb planning metrics to address problems. But these solutions typically involve building more space—something many major airports are not in a financial position to do.

A new solution—passenger analytics and information-based management—is emerging as a promising tool to help airport managers face these challenges. It is a solution that makes use of cost-effective sensor technologies to optimize the space airports already have and make more strategic decisions based on highly detailed, trusted information.

## Understanding passenger analytics: A three-step process toward airport performance optimization

Passenger analytics involves three interconnected elements that capture passenger movement information within the airport terminal and use these data to make more informed and effective decisions about management and layout:

1. Systematic data capture
2. Analysis and predictive modeling
3. Performance optimization

### 1. Systematic data capture

Wi-Fi. Bluetooth. Closed-circuit television. Radio frequency identification. Infrared tracking. The use of these tracking technologies has been honed in other industries, principally in big box retail, stadium management, and transportation logistics. However, over the past several years we have seen tracking technology installed at airports to follow passenger movement. The ability to capture detailed passenger information is beginning to change the way airport managers think, react, and plan.

Sensor technologies can systematically track passenger movement within an airport, and those data can then be linked to a range of other information sources such as airline passenger data, FIDS, OAG schedules, and retail points of sale. The combined data are fed into a centralized information database, which is assessable by airport management.

Choosing the best technology solution is an individual and important consideration because with variations in airport terminal layouts, there is no one-size-fits-all solution. A better approach is likely a purpose-built solution using multiple technologies and applications. Two key points airport managers will want to consider when making strategic sensor technology decisions are clarifying current airport data analytic capabilities and understanding airport goals for use of current and future data.

Answers to these strategic questions will lead to other considerations, including where to warehouse this information, the role of other airport stakeholders—airlines, commercial concessionaires, government entities—in providing and/or accessing information (an airport operational database), and to what extent can/should this information be monetized. These issues may need to be thought through as part of an airport IT strategic plan.



## 2. Analysis and predictive modeling

Data are only as useful as their ability to measure and analyze information in a meaningful way. Technology is a tool, but one that must be wielded effectively. Thus, building a database of historical trends—and using these data to build predictive modeling—is key to optimizing airport performance. Analysis of current and historical data enables airport managers to understand passenger behavior as well as the root causes of airport congestion and bottlenecks.

Managers can designate specific zones within the airport and then build models to predict detailed passenger flow within those zones. This step of the process also includes establishing key operational performance measures (KPIs), identifying optimization potential, and analyzing cost benefits. The result is not only understanding where and how current congestion occurs, but also predicting where future bottlenecks may emerge so that managers can take steps to mitigate or eliminate them.

As operational and physical improvements are considered, managers can model the impact of potential changes before putting them in place. Data-based information about more efficient use of current capacity and the need for additional capacity enables managers to properly allocate funds and determine the best timing—if necessary—for build out.

## 3. Performance optimization

The final step of performance optimization involves a transformation of the airport management process. Traditional airport management has typically been a reactive process, largely because of a lack of information. Tracking technology and predictive modeling enables an airport to develop a new management approach, management by information. Getting airport staff to change how they conduct business and make decisions may be the most challenging part of the process.

Through the active capture of information—tracking queuing behavior, facility bottlenecks, passenger flows—and then predicting ongoing resource demands, management can use information to establish KPIs, refine retail product mix, and work collaboratively with airport stakeholders (airlines, TSA, concessionaires, third-party vendors).

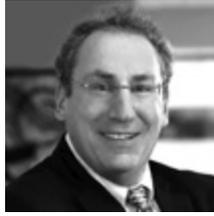
Because this approach involves multiple disciplines within an airport—IT, operations, business office—and new ways of interacting with airport stakeholders, airport management may need to rethink organizational structure, communication and coordination with stakeholders, and the decision-making process. A shift to "management by information" may involve redesigning the airport organization along strategic objectives rather than functional lines.

Successfully implemented, management by information will improve airport performance, enhance passenger experience, generate additional nonaeronautical revenue, reorient airport management objectives, and more effectively allocate physical and human resources.



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**About the Author**

Eliot Lees specializes in aviation due diligence, business strategy, and infrastructure-related development such as airport/city projects, air cargo, aircraft maintenance, logistics centers, business/industrial estates, fixed base operators, aerospace manufacturing, and fueling. He has worked on a wide range of client engagements in airports, airline, and aerospace.

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